**Saman Tahoe To-Do for Electro-Elasto-Capillary Simulations**

SolidElementT.cpp: Efield size is NumSD + 1 – why? Issues with outputting Efield for 2D simulations, which is important because may want to output Efield for a given nodel as a function of applied voltage to study instabilities. Search for ND\_ELEC\_FLD. In SolidElementT::SetNodalOutputCodes, you’ll notice that

counts[ND\_ELEC\_FLD] = NumSD()+1;

Not sure why it’s NumSD()+1. I think it should be NumSD()

In line 1905 of SolidElementT, the electric field output array is defined. Look at the iNodalStrain output in line 1921. Notice that theres elabels1D, elabels2D, and elabels3D. You need to create an elabels2D case just like that for the electric field since we’re working in 2D. You should also create a elabels3D case because in general someone could use that option also.

Actual calculation of the electric field nodal values happens in FSDielectricElastomerQ1P02DT::AddNodalForce. You should verify that the electric field that is calculated is correct.

You can see the issue by outputting the electric field as a nodal variable – for a 2D problem, I think the y-value will be incorrect.

You might need to implement FSDielectricElastomerQ1P0SurfaceT::ComputeOutput, similar to FSDielectricElastomerQ1P02DT::ComputeOutput

**Simulations to Test:**

1. Homogeneous deformation (single element with surface tension, applied charge)
2. Inhomogeneous deformation (single element with surface tension, applied voltage)
3. Bursting drop (Figure 7 in parkSM2013), plot Efield at bubble crack tip for different values of surface tension. Also plot crack propagation distance as function of E for different values of surface tension
4. Type of surface instability for constrained thin film (like Figure 2 in parkCMAME2013) as a function of surface tension (gamma). We can refer to Wang and Zhao, Physical Review E 2013; 88:042403 for a similar experiment

Note: all of the above simulations are “static”, in the sense that find equilibrium configuration due to surface tension first before applying electric field, i.e. the surface tension time scale will be smaller than the electric field time scale.

We can later examine dynamic effects where surface tension and electric fields are applied at the same time.